

Claims

1. A process for producing a fine silver
particle colloidal dispersion of a water system, which
5 comprises:

a reaction step of allowing an aqueous silver
nitrate solution to react with a mixed solution of an
aqueous iron(II) sulfate solution and an aqueous
sodium citrate solution to form an agglomerate of fine
10 silver particles;

a filtration step of filtering the resultant
agglomerate of fine silver particles to obtain a cake
of the agglomerate of fine silver particles;

a dispersion step of adding pure water to the
15 cake to obtain a first fine silver particle colloidal
dispersion of a water system in which dispersion the
fine silver particles have been dispersed in the pure
water; and

a concentration and washing step of concentrating
20 and washing the first fine silver particle colloidal
dispersion of a water system.

2. The process for producing a fine silver
particle colloidal dispersion according to claim 1,
25 wherein the fine silver particle colloidal dispersion
is controlled to have an electric conductivity of 200

$\mu\text{S}/\text{cm}$ or less at the solvent part exclusive of the fine silver particles from said fine silver particle colloidal dispersion of a water system.

5 3. The process for producing a fine silver particle colloidal dispersion according to claim 1, wherein the fine silver particles in said fine silver particle colloidal dispersion of a water system have an average particle diameter of from 1 nm to 30 nm.

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4. The process for producing a fine silver particle colloidal dispersion according to claim 1, wherein the fine silver particles in said fine silver particle colloidal dispersion of a water system are in 15 a concentration of from 10% by weight to 70% by weight.

5. A fine silver particle colloidal dispersion of a water system, which has been produced by the process according to any one of claims 1 to 4.

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6. A fine silver particle colloidal dispersion of a water system, which comprises having water as a solvent, containing fine silver particles dispersed in a concentration of from 10 to 70% by weight, 25 containing no polymeric dispersing agent, and having an electric conductivity of 200 $\mu\text{S}/\text{cm}$ or less at the

solvent part exclusive of the fine silver particles.

7. The fine silver particle colloidal dispersion according to claim 6, wherein said fine silver
5 particles have an average particle diameter of from 1 nm to 30 nm.

8. A conductive silver film which comprises being formed by the use of the fine silver particle
10 colloidal dispersion according to any one of claims 5 to 7.

9. A process for producing a fine silver particle colloidal dispersion of a water-organic
15 solvent system which comprises:

a reaction step of allowing an aqueous silver nitrate solution to react with a mixed solution of an aqueous iron(II) sulfate solution and an aqueous sodium citrate solution to form an agglomerate of fine
20 silver particles;

a filtration step of filtering the resultant agglomerate of fine silver particles to obtain a cake of the agglomerate of fine silver particles;

a dispersion step of adding pure water to the
25 cake to obtain a first fine silver particle colloidal dispersion of a water system in which dispersion the

fine silver particles have been dispersed in the pure water;

a concentration and washing step of concentrating and washing the first fine silver particle colloidal dispersion of a water system to obtain a second fine silver particle colloidal dispersion of a water system; and

a dilution and viscosity modifying step of adding an organic solvent to the second fine silver particle colloidal dispersion of a water system.

10. The process for producing a fine silver particle colloidal dispersion according to claim 9, wherein said organic solvent comprises dimethyl sulfoxide.

15. The process for producing a fine silver particle colloidal dispersion according to claim 9, wherein the fine silver particle colloidal dispersion is controlled to have an electric conductivity of 200 $\mu\text{S}/\text{cm}$ or less at the solvent part exclusive of the fine silver particles from said second fine silver particle colloidal dispersion of a water system.

25. 12. The process for producing a fine silver particle colloidal dispersion according to claim 9,

wherein the fine silver particles in said fine silver particle colloidal dispersion of a water-organic system have an average particle diameter of from 1 nm to 30 nm.

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13. The process for producing a fine silver particle colloidal dispersion according to claim 9, wherein the fine silver particles in said fine silver particle colloidal dispersion of a water-organic solvent system are in a concentration of from 10% by weight to 70% by weight.

14. A fine silver particle colloidal dispersion of a water-organic solvent system, which has been produced by the process according to any one of claims 9 to 13.

15. A fine silver particle colloidal dispersion of a water-organic solvent system, which comprises having water and an organic solvent as solvents, containing fine silver particles dispersed in a concentration of from 10 to 70% by weight, containing no polymeric dispersing agent, and having viscosity having been controlled within the range of from 1 to 25 1,000,000 mPa·s.

16. The fine silver particle colloidal dispersion according to claim 15, wherein said organic solvent comprises dimethyl sulfoxide.

5 17. The fine silver particle colloidal dispersion according to claim 15, wherein said fine silver particles have an average particle diameter of from 1 nm to 30 nm.

10 18. A conductive silver film which comprises being formed by the use of the fine silver particle colloidal dispersion according to any one of claims 14 to 17.

15 19. A process for producing a fine silver particle colloidal dispersion of an organic solvent system, which comprises:

20 a reaction step of allowing an aqueous silver nitrate solution to react with a mixed solution of an aqueous iron(II) sulfate solution and an aqueous sodium citrate solution to form an agglomerate of fine silver particles;

25 a filtration step of filtering the resultant agglomerate of fine silver particles to obtain a cake of the agglomerate of fine silver particles;

 a dispersion step of adding pure water to the

cake to obtain a first fine silver particle colloidal dispersion of a water system in which dispersion the fine silver particles have been dispersed in the pure water;

5 a concentration and washing step of concentrating and washing the first fine silver particle colloidal dispersion of a water system to obtain a second fine silver particle colloidal dispersion of a water system; and

10 a solvent displacement step of adding an organic solvent to the second fine silver particle colloidal dispersion of a water system and thereafter removing the water.

15 20. The process for producing a fine silver particle colloidal dispersion according to claim 19, wherein said organic solvent comprises dimethyl sulfoxide.

20 21. The process for producing a fine silver particle colloidal dispersion according to claim 19, wherein the fine silver particle colloidal dispersion is controlled to have an electric conductivity of 200 $\mu\text{S}/\text{cm}$ or less at the solvent part exclusive of the
25 fine silver particles from said second fine silver particle colloidal dispersion of a water system.

22. The process for producing a fine silver particle colloidal dispersion according to claim 19, wherein the fine silver particles in said fine silver particle colloidal dispersion of an organic solvent system have an average particle diameter of from 1 nm to 30 nm.

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10 23. The process for producing a fine silver particle colloidal dispersion according to claim 19, wherein the fine silver particles in said fine silver particle colloidal dispersion of an organic solvent system are in a concentration of from 10% by weight to, 70% by weight.

15 24. A fine silver particle colloidal dispersion of an organic solvent system, which has been produced by the process according to any one of claims 19 to 23.

20 25. A fine silver particle colloidal dispersion of an organic solvent system, which comprises having an organic solvent, containing fine silver particles dispersed therein in a concentration of from 10 to 70% by weight, containing no polymeric dispersing agent, and having viscosity having been controlled within the 25 range of from 1 to 1,000,000 mPa·s.

26. The fine silver particle colloidal dispersion according to claim 25, wherein said organic solvent comprises dimethyl sulfoxide.

5 27. The fine silver particle colloidal dispersion according to claim 25, wherein said fine silver particles have an average particle diameter of from 1 nm to 30 nm.

10 28. A conductive silver film which comprises being formed by the use of the fine silver particle colloidal dispersion according to any one of claims 24 to 27.